

## PATENT ABSTRACTS OF JAPAN

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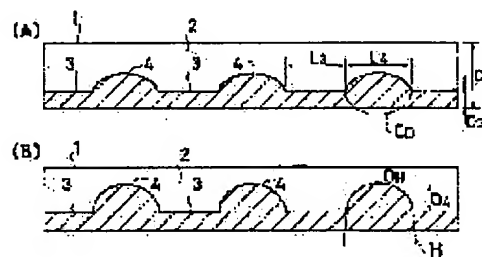
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## (54) PLASTIC SHEET WITH FOLDING RULE AND PACKAGING CASE

(57)Abstract:

PROBLEM TO BE SOLVED: To neatly assemble a plastic sheet with a folding rule without generating insufficient folding and excessive folding.

SOLUTION: The folding rule formed in the plastic sheet is formed from recessed grooves in which deep groove parts and shallow groove parts are arranged alternately in the length direction, and the cross section in the length direction of the shallow groove part is shaped to be a part of an ellipse or a parabola, or a chevron of a semicircle, an ellipse, etc. The top of the chevron is warped or flattened.



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CLAIMS

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[Claim(s)]

[Claim 1] The sheet plastic containing a bending ruled line characterized by the thing for which the concave used as a bending ruled line prepared the deep concave section and the shallow concave section by turns, and was formed along the die-length direction, and which prepared so that it bent, and it might be a sheet plastic containing a ruled line and the cross section of the die-length direction of said shallow concave section might serve as Yamagata.

[Claim 2] The sheet plastic containing a bending ruled line according to claim 1 which made the crowning of Yamagata the shape of a curve configuration or flatness.

[Claim 3] The sheet plastic containing a bending ruled line according to claim 1 carried out as [ be / Yamagata / elliptical / a part of / or a part of parabola configuration containing \*\*\*\*\* ].

[Claim 4] The sheet plastic containing a bending ruled line given in any of claims 1-3 which were made to penetrate to a sheet rear-face side, and prepared the deep concave section they are.

[Claim 5] The package case which pierced the sheet plastic given in any of claims 1-4 they are for the predetermined profile, and bent and assembled this along with the ruled line.

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[Translation done.]

DETAILED DESCRIPTION

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## [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the sheet plastic of the structure corresponding to the assembly in an automatic box-producing machine.

[0002]

[Description of the Prior Art] As a sheet plastic bent and processed into a package case, as shown to drawing 8 by the sectional view Irregularity is formed in the pars basilaris ossis occipitalis of the concave 12 which forms the ruled line formed in the front face of a sheet 11 along the die-length direction (this drawing (A)), or an intermittence hole is formed (this drawing (B)), and the thing of structure which formed the concave section 13 with the deep depth and the shallow concave section 14 by turns is known.

[0003]

[Problem(s) to be Solved by the Invention] Although it bent as compared with the thing of the structure where the thing of structure does not have irregularity in the pars basilaris ossis occipitalis of a ruled line conventionally and the sex was good, when a sheet was assembled using a box-producing machine, how to bend depending on conditions, such as the quality of the material of a sheet and thickness, was inadequate, a case could not be assembled, but even if it could compare and assemble, the case might deform. When it bent this and reversely beyond the need, the case might deform too. Moreover, the amount of [ which was exposed from the concave in connection with bending of a sheet ] concave heights split finely, it might worsen [ feel ] and the crack and the gash might be made.

[0004]

[Problem(s) to be Solved by the Invention] This invention makes it a technical problem to enable it to assemble strongly and finely, without causing poor processing, such as inadequate bending and past [ deflection ], when assembling the sheet plastic containing a bending ruled line automatically in view of such a trouble of having the conventional technique.

[0005]

[Means for Solving the Problem] In order to solve said technical problem, along the die-length direction, the concave used as a bending ruled line prepares the deep concave section and the shallow concave section by turns, and is formed, and the sheet plastic containing a bending ruled line of this invention is characterized by preparing so that the cross section of the die-length direction of the shallow concave section may serve as Yamagata (claim 1). According to this, since the pars basilaris ossis occipitalis of a ruled line is carrying out irregularity in the die-length direction by the deep concave section and the shallow concave section, both the flexibility of a sheet and rigidity are held and good bending nature is obtained. Since the shallow concave section is prepared in cross-section Yamagata, when a sheet is bent, in a ruled line, it is hard coming to generate sharp irregularity, and a feel becomes good.

[0006] A center section is high in the configuration of Yamagata which appears in the cross section of the shallow concave section, and the unsymmetrical configuration to which a crowning besides the configuration to which the both-sides section becomes low at an equal rate becomes [ a bias and its both sides ] gradually low at 1 side is included in it. Moreover, two or more small Yamagata is put in a row to Yamagata of one, and it may prepare, or as there are two or more crownings, a front face may be gradually prepared so that height may differ stair-like. What is necessary is just to have prepared so that it may have at least one crowning, it may stand in a row in the deep concave section from top both sides in short and height may differ continuously.

[0007] It is desirable to make a crowning into the curved curved-surface configuration or a flat configuration in any configuration (claim 2). If a crowning is prepared in a curve configuration or a flat configuration, since the resin of this part will be compressed and reinforcement will become high, when a sheet is bent, it does not split finely, but neither a crack nor a gash is also produced.

[0008] When a sheet is bent along with a ruled line, the configuration of Yamagata can be

suitably selected according to the proportion of the quality of the material of a sheet, thickness, the width of face and die length of a concave, the deep concave section, and the shallow concave section etc. so that poor processing may not be produced. For example, it can consider as the shape of a configuration [ as / whose Yamagata is elliptical / a part of / and a part of parabola configuration containing \*\*\*\*\* ], and a hemicycle, an ellipse configuration, etc. (claim 3). In order to make bending nature of a sheet good, when establishing Yamagata in the shape of a hemicycle, and an ellipse configuration, it is desirable to set up so that the core of the surface radii may be located in the interior of a sheet.

[0009] In addition, it may be made to penetrate to the case where it has proper thickness from a sheet rear face, and a rear-face side, and the shallow concave section and the deep concave section arranged by turns may be taken as puncturing (claim 4). Although it becomes easy to bend rather than the case where distortion and elastic force which are produced when it bends distribute in the die-length direction of a concave, and thickness has them in the deep concave section when the deep concave section is considered as puncturing, as it mentioned above whether it would be made whether consider the deep concave section as puncturing, or for there to be thickness, according to the quality of the material of a sheet, the process condition of thickness and a concave, etc., it may be selected so that poor processing may not be produced. [0010] Moreover, the concave used as a ruled line is prepared in one side of a sheet, and also it can be prepared in both sides of a sheet. When preparing in both sides of a sheet, the concave of the field by the side of one should just be constituted like the above.

[0011] Moreover, the package case of this invention can pierce the sheet of each of said configuration for a predetermined profile, and can obtain it by bending and assembling this along with a ruled line (claim 5).

[0012] In addition, as a sheet plastic with which this invention is applied, a simple substance or compound sheets, such as a polyvinyl chloride, polyethylene, polypropylene, polyester, and a polycarbonate, can be used. The thickness of a sheet is not usually limited to this, although an about 0.1-1.0mm thing is used.

[0013]

[Embodiment of the Invention] The sheet plastic of this invention is the thing of the structure formed as the concave used as a bending ruled line prepared the deep concave section (henceforth a deep groove), and the shallow concave section (henceforth a shallow groove part) by turns along the die-length direction and the cross section of the die-length direction of a shallow groove part became Yamagata. Hereafter, an example of the operation gestalt of the ruled line formed in a sheet is explained with reference to the drawing in which the cross section of a ruled line part was shown. Among drawing, in a sheet and 2, a ruled line and 3 show a deep groove and 4 shows [ the sign 1 ] the shallow groove part.

[0014] Drawing 1 shows the gestalt which prepared thickness in the deep groove 3 and formed the ruled line 2. This drawing (A) is established in a curved-surface configuration in which the cross section of the direction of a ruled line makes elliptical [ a part of ] (CD) for a shallow groove part 4. This drawing (B) is established in a curved-surface configuration which makes a part of parabola configuration (H) in which the cross section of the direction of a ruled line contains \*\*\*\*\* (OH) for a shallow groove part 4.

[0015] in addition -- drawing -- the ruled line lay length (L3, L4) of a deep groove 3 and a shallow groove part 4 -- the almost same die length -- carrying out -- moreover, the thickness (D3) of a deep groove 3 -- about [ of the thickness (D1) of a sheet ] -- although referred to as one fourth, it is not limited to this but can set up suitably according to the quality of the material, thickness, etc. of a sheet. The same is said of the thickness (D4) of a shallow groove part 4.

[0016] Drawing 2 shows the gestalt which prepared in puncturing which penetrated the deep groove 3 to the rear-face side of a sheet 1 at the rear-face side, and formed the ruled line 2. With this gestalt, the thickness (D3) of a deep groove 3 is set to 0mm. This drawing (A) is established in a curved-surface configuration in which the cross section of the direction of a ruled line makes elliptical [ a part of ] for a shallow groove part 4. This drawing (B) is established in a curved-surface configuration which makes a part of parabola configuration in which the

cross section of the direction of a ruled line contains \*\*\*\*\* for a shallow groove part 4. This drawing (C) is established in a curved-surface configuration in which the cross section of the direction of a ruled line makes the shape of a hemicycle for a shallow groove part 4. With this gestalt, the core (O) of the surface radii of a shallow groove part 4 is set up so that it may be located in the rear-face side edge section of a sheet 1. This drawing (D) is established in a curved-surface configuration in which the cross section of the direction of a ruled line makes an ellipse configuration for a shallow groove part 4. With this gestalt, the core (O) of the surface radii of a shallow groove part 4 is set up so that it may be located in the method approach of the inside of a sheet rather than the rear-face side edge section of a sheet 1.

[0017] Drawing 3 shows the gestalt formed in the curved-surface configuration where Yamagata which appears a shallow groove part 4 in the cross section of the direction of a ruled line combined with the interior of a sheet two radii which have the central point. It has prepared so that what this drawing (A) formed the ruled line 2 for thickness in the deep groove 3, and was formed, and this drawing (B) establish a deep groove 3 in puncturing, and it forms, and surface radii may become of increase of thickness with radius of curvature with the both sides fixed [ both the shallow groove parts 4 ] from a deep groove 3, may become a little and low rather than top-most vertices in the center section at a sheet front-face side and it may cross.

[0018] The angle section of a shallow groove part 4 can prepare the shape of said elliptical and parabola configuration, and a hemicycle, an ellipse configuration, and other curved-surface configurations and flat-surface configurations in the configuration combined suitably, and drawing 4 shows an example of the combination. This drawing (A) is established in the curved-surface configuration which combined two radii which have the central point for the cross section of a shallow groove part 4 inside a sheet like drawing 3, and it is the center section of the shallow groove part 4, and is made for the height to become almost the same as the height of both sides. This drawing (B) is established in the configuration where two trapezoidal shape was put in order for the cross section of a shallow groove part 4. Both, a side face is incurvated and this drawing (C) is established in the configuration two trapezoidal shape is put [ a configuration ] in order for the cross section of a shallow groove part 4 and which made the top face the shape of flatness mostly. As for this drawing (D), the cross section of a shallow groove part 4 is established in the curved-surface configuration where three curve sides were arranged in the almost same height. This drawing (E) is a curved-surface configuration which consists the cross section of a shallow groove part 4 of three curve sides, makes the curve side of a center section higher than it, and establishes the curve side of both sides in the same height at a form like offering rice cake. This drawing (F) is established in the curved-surface configuration which divided the curve side of the center section shown in (E) on the curved surface of still smaller radii, and combined four radii on the whole.

[0019] To the deep groove 3 of each of said drawing fixing thickness of the direction of a ruled line, and having prepared, along the direction of a ruled line, drawing 5 is prepared, as thickness differs gradually. When the cross section of a ruled line 2 is seen, the part with the smallest thickness of a deep groove 3 and the crowning of a shallow groove part 4 to which thickness becomes large most are connected in a straight line, and this drawing (A) is prepared so that it may become the cross section of a triangular waveform as the whole ruled line. This drawing (B) makes the crowning of the shallow groove part 4 shown in (A) the shape of flatness, and is a thing. This drawing (C) incurvates the part with the smallest thickness of a deep groove 3 and the crowning of a shallow groove part 4 which were shown in (A), and it is prepared so that it may become the cross section of a curve wave as the whole ruled line.

[0020] Drawing 6 shows the gestalt which prepared the concave used as a ruled line in both sides of a sheet 1. This drawing (A) forms the concave 5 of the fixed depth which met the ruled line 2 in the rear-face side of a sheet 1 while forming the ruled line 2 which consists of a deep groove 3 and a cross-section elliptical shallow groove part 4 from the front-face side of a sheet 1. This concave 5 is formed in the depth smaller than the thickness of a deep groove 3 for the breakage prevention at the time of bending a sheet 1. This drawing (B) forms the cross-section elliptical concave 5 in the formation location of said shallow groove part 4 by the side of the rear face of a sheet 1 while forming the ruled line 2 which consists of a deep groove 3 and a cross-

section elliptical shallow groove part 4 from the front-face side of a sheet 1. In this case, a concave 5 is formed in the same cross-section configuration as a shallow groove part 4, and also it may prepare the thing of a different cross-section configuration.

[0021] In addition, in said each drawing, Ryobe's boundary line may lie at right angles to the direction of a ruled line, the sense in the interior of the ruled line of the deep groove 3 prepared by turns and a shallow groove part 4 may incline, or any are sufficient as it. For example, although drawing 7 (A) shows the cross section which met the ruled line 2, as shown in this drawing, the boundary line of the deep groove 3 of a ruled line 2 and a shallow groove part 4 inclines to the direction of a ruled line, and it can also prepare the top view of the sheet 1 containing a ruled line 2, and (B).

[0022] The configuration of the ruled line 2 shown in each drawing is an example, and the sheet plastic of this invention is not limited to the illustrated gestalt. Combining the deep groove 3 and shallow groove part 4 of each drawing, or constituting a ruled line 2 combining these and well-known ruled line structure is performed suitably.

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[Translation done.]

## TECHNICAL FIELD

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[Field of the Invention] This invention relates to the sheet plastic of the structure corresponding to the assembly in an automatic box-producing machine.



PRIOR ART

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[Description of the Prior Art] As a sheet plastic bent and processed into a package case, as shown to drawing 8 by the sectional view Irregularity is formed in the pars basilaris ossis occipitalis of the concave 12 which forms the ruled line formed in the front face of a sheet 11 along the die-length direction (this drawing (A)), or an intermittence hole is formed (this drawing (B)), and the thing of structure which formed the concave section 13 with the deep depth and the shallow concave section 14 by turns is known.

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[Translation done.]

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] Although it bent as compared with the thing of the structure where the thing of structure does not have irregularity in the pars basilaris ossis occipitalis of a ruled line conventionally and the sex was good, when a sheet was assembled using a box-producing machine, how to bend depending on conditions, such as the quality of the material of a sheet and thickness, was inadequate, a case could not be assembled, but even if it could compare and assemble, the case might deform. When it bent this and reversely beyond the need, the case might deform too. Moreover, the amount of [ which was exposed from the concave in connection with bending of a sheet ] concave heights split finely, it might worsen [ feel ] and the crack and the gash might be made.

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[Translation done.]

## MEANS

[Means for Solving the Problem] In order to solve said technical problem, along the die-length direction, the concave used as a bending ruled line prepares the deep concave section and the shallow concave section by turns, and is formed, and the sheet plastic containing a bending ruled line of this invention is characterized by preparing so that the cross section of the die-length direction of the shallow concave section may serve as Yamagata (claim 1). According to this, since the pars basilaris ossis occipitalis of a ruled line is carrying out irregularity in the die-length direction by the deep concave section and the shallow concave section, both the flexibility of a sheet and rigidity are held and good bending nature is obtained. Since the shallow concave section is prepared in cross-section Yamagata, when a sheet is bent, in a ruled line, it is hard coming to generate sharp irregularity, and a feel becomes good.

[0006] A center section is high in the configuration of Yamagata which appears in the cross section of the shallow concave section, and the unsymmetrical configuration to which a crowning besides the configuration to which the both-sides section becomes low at an equal rate becomes [ a bias and its both sides ] gradually low at 1 side is included in it. Moreover, two or more small Yamagata is put in a row to Yamagata of one, and it may prepare, or as there are two or more crownings, a front face may be gradually prepared so that height may differ stair-like. What is necessary is just to have prepared so that it may have at least one crowning, it may stand in a row in the deep concave section from top both sides in short and height may differ continuously.

[0007] It is desirable to make a crowning into the curved curved-surface configuration or a flat configuration in any configuration (claim 2). If a crowning is prepared in a curve configuration or a flat configuration, since the resin of this part will be compressed and reinforcement will become high, when a sheet is bent, it does not split finely, but neither a crack nor a gash is also produced.

[0008] When a sheet is bent along with a ruled line, the configuration of Yamagata can be suitably selected according to the proportion of the quality of the material of a sheet, thickness, the width of face and die length of a concave, the deep concave section, and the shallow concave section etc. so that poor processing may not be produced. For example, it can consider as the shape of a configuration [ as / whose Yamagata is elliptical / a part of / and a part of parabola configuration containing \*\*\*\*\* ], and a semicircle, an ellipse configuration, etc. (claim 3). In order to make bending nature of a sheet good, when establishing Yamagata in the shape of a semicircle, and an ellipse configuration, it is desirable to set up so that the core of the surface radii may be located in the interior of a sheet.

[0009] In addition, it may be made to penetrate to the case where it has proper thickness from a sheet rear face, and a rear-face side, and the shallow concave section and the deep concave section arranged by turns may be taken as puncturing (claim 4). Although it becomes easy to bend rather than the case where distortion and elastic force which are produced when it bends distribute in the die-length direction of a concave, and thickness has them in the deep concave section when the deep concave section is considered as puncturing, as it mentioned above whether it would be made whether consider the deep concave section as puncturing, or for there to be thickness, according to the quality of the material of a sheet, the process condition of thickness and a concave, etc., it may be selected so that poor processing may not be produced.

[0010] Moreover, the concave used as a ruled line is prepared in one side of a sheet, and also it can be prepared in both sides of a sheet. When preparing in both sides of a sheet, the concave of the field by the side of one should just be constituted like the above.

[0011] Moreover, the package case of this invention can pierce the sheet of each of said configuration for a predetermined profile, and can obtain it by bending and assembling this along with a ruled line (claim 5).

[0012] In addition, as a sheet plastic with which this invention is applied, a simple substance or compound sheets, such as a polyvinyl chloride, polyethylene, polypropylene, polyester, and a polycarbonate, can be used. The thickness of a sheet is not usually limited to this, although an about 0.1-1.0mm thing is used.

[0013]

[Embodiment of the Invention] The sheet plastic of this invention is the thing of the structure formed as the concave used as a bending ruled line prepared the deep concave section (henceforth a deep groove), and the shallow concave section (henceforth a shallow groove part) by turns along the die-length direction and the cross section of the die-length direction of a shallow groove part became Yamagata. Hereafter, an example of the operation gestalt of the ruled line formed in a sheet is explained with reference to the drawing in which the cross section of a ruled line part was shown. Among drawing, in a sheet and 2, a ruled line and 3 show a deep groove and 4 shows [ the sign 1 ] the shallow groove part.

[0014] Drawing 1 shows the gestalt which prepared thickness in the deep groove 3 and formed the ruled line 2. This drawing (A) is established in a curved-surface configuration in which the cross section of the direction of a ruled line makes elliptical [ a part of ] (CD) for a shallow groove part 4. This drawing (B) is established in a curved-surface configuration which makes a part of parabola configuration (H) in which the cross section of the direction of a ruled line contains \*\*\*\*\* (OH) for a shallow groove part 4.

[0015] in addition — drawing — the ruled line lay length (L3, L4) of a deep groove 3 and a shallow groove part 4 — the almost same die length — carrying out — moreover, the thickness (D3) of a deep groove 3 — about [ of the thickness (D1) of a sheet ] — although referred to as one fourth, it is not limited to this but can set up suitably according to the quality of the material, thickness, etc. of a sheet. The same is said of the thickness (D4) of a shallow groove part 4.

[0016] Drawing 2 shows the gestalt which prepared in puncturing which penetrated the deep groove 3 to the rear-face side of a sheet 1 at the rear-face side, and formed the ruled line 2. With this gestalt, the thickness (D3) of a deep groove 3 is set to 0mm. This drawing (A) is established in a curved-surface configuration in which the cross section of the direction of a ruled line makes elliptical [ a part of ] for a shallow groove part 4. This drawing (B) is established in a curved-surface configuration which makes a part of parabola configuration in which the cross section of the direction of a ruled line contains \*\*\*\*\* for a shallow groove part 4. This drawing (C) is established in a curved-surface configuration in which the cross section of the direction of a ruled line makes the shape of a hemicycle for a shallow groove part 4. With this gestalt, the core (O) of the surface radii of a shallow groove part 4 is set up so that it may be located in the rear-face side edge section of a sheet 1. This drawing (D) is established in a curved-surface configuration in which the cross section of the direction of a ruled line makes an ellipse configuration for a shallow groove part 4. With this gestalt, the core (O) of the surface radii of a shallow groove part 4 is set up so that it may be located in the method approach of the inside of a sheet rather than the rear-face side edge section of a sheet 1.

[0017] Drawing 3 shows the gestalt formed in the curved-surface configuration where Yamagata which appears a shallow groove part 4 in the cross section of the direction of a ruled line combined with the interior of a sheet two radii which have the central point. It has prepared so that what this drawing (A) formed the ruled line 2 for thickness in the deep groove 3, and was formed, and this drawing (B) establish a deep groove 3 in puncturing, and it forms, and surface radii may become of increase of thickness with radius of curvature with the both sides fixed [ both the shallow groove parts 4 ] from a deep groove 3, may become a little and low rather than top-most vertices in the center section at a sheet front-face side and it may cross.

[0018] The angle section of a shallow groove part 4 can prepare the shape of said elliptical and parabola configuration, and a hemicycle, an ellipse configuration, and other curved-surface configurations and flat-surface configurations in the configuration combined suitably, and drawing 4 shows an example of the combination. This drawing (A) is established in the curved-surface configuration which combined two radii which have the central point for the cross section of a shallow groove part 4 inside a sheet like drawing 3, and it is the center section of the shallow groove part 4, and is made for the height to become almost the same as the height of both sides. This drawing (B) is established in the configuration where two trapezoidal shape was put in order for the cross section of a shallow groove part 4. Both, a side face is incurvated and this drawing (C) is established in the configuration two trapezoidal shape is put [ a configuration ] in order for

the cross section of a shallow groove part 4 and which made the top face the shape of flatness mostly. As for this drawing (D), the cross section of a shallow groove part 4 is established in the curved-surface configuration where three curve sides were arranged in the almost same height. This drawing (E) is a curved-surface configuration which consists the cross section of a shallow groove part 4 of three curve sides, makes the curve side of a center section higher than it, and establishes the curve side of both sides in the same height at a form like offering rice cake. This drawing (F) is established in the curved-surface configuration which divided the curve side of the center section shown in (E) on the curved surface of still smaller radii, and combined four radii on the whole.

[0019] To the deep groove 3 of each of said drawing fixing thickness of the direction of a ruled line, and having prepared, along the direction of a ruled line, drawing 5 is prepared, as thickness differs gradually. When the cross section of a ruled line 2 is seen, the part with the smallest thickness of a deep groove 3 and the crowning of a shallow groove part 4 to which thickness becomes large most are connected in a straight line, and this drawing (A) is prepared so that it may become the cross section of a triangular waveform as the whole ruled line. This drawing (B) makes the crowning of the shallow groove part 4 shown in (A) the shape of flatness, and is a thing. This drawing (C) incurvates the part with the smallest thickness of a deep groove 3 and the crowning of a shallow groove part 4 which were shown in (A), and it is prepared so that it may become the cross section of a curve wave as the whole ruled line.

[0020] Drawing 6 shows the gestalt which prepared the concave used as a ruled line in both sides of a sheet 1. This drawing (A) forms the concave 5 of the fixed depth which met the ruled line 2 in the rear-face side of a sheet 1 while forming the ruled line 2 which consists of a deep groove 3 and a cross-section elliptical shallow groove part 4 from the front-face side of a sheet 1. This concave 5 is formed in the depth smaller than the thickness of a deep groove 3 for the breakage prevention at the time of bending a sheet 1. This drawing (B) forms the cross-section elliptical concave 5 in the formation location of said shallow groove part 4 by the side of the rear face of a sheet 1 while forming the ruled line 2 which consists of a deep groove 3 and a cross-section elliptical shallow groove part 4 from the front-face side of a sheet 1. In this case, a concave 5 is formed in the same cross-section configuration as a shallow groove part 4, and also it may prepare the thing of a different cross-section configuration.

[0021] In addition, in said each drawing, Ryobe's boundary line may lie at right angles to the direction of a ruled line, the sense in the interior of the ruled line of the deep groove 3 prepared by turns and a shallow groove part 4 may incline, or any are sufficient as it. For example, although drawing 7 (A) shows the cross section which met the ruled line 2, as shown in this drawing, the boundary line of the deep groove 3 of a ruled line 2 and a shallow groove part 4 inclines to the direction of a ruled line, and it can also prepare the top view of the sheet 1 containing a ruled line 2, and (B).

[0022] The configuration of the ruled line 2 shown in each drawing is an example, and the sheet plastic of this invention is not limited to the illustrated gestalt. Combining the deep groove 3 and shallow groove part 4 of each drawing, or constituting a ruled line 2 combining these and well-known ruled line structure is performed suitably.

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[Translation done.]

## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] (A) and (B) are the sectional views of a ruled line part showing the operation gestalt of this invention which prepared thickness in the deep groove.

[Drawing 2] (A) - (D) is the sectional view of a ruled line part showing the operation gestalt of this invention which prepared puncturing in the deep groove and formed the ruled line.

[Drawing 3] (A) and (B) are the sectional views of a ruled line part showing the operation gestalt of this invention which formed the cross section of a shallow groove part combining two curved surfaces.

[Drawing 4] (A) - (F) is drawing showing the cross section of the shallow groove part formed combining two or more fields.

[Drawing 5] (A) - (C) is the sectional view of a ruled line part showing the operation gestalt of this invention which changed the thickness of a deep groove continuously.

[Drawing 6] (A) and (B) are the sectional views of a ruled line part showing the operation gestalt of this invention which prepared the concave in front flesh-side both sides of a sheet.

[Drawing 7] The operation gestalt of this invention which made the boundary line of a deep groove and a shallow groove part incline to the direction of a ruled line is shown, and it is the sectional view where (A) met the important section top view of a sheet, and (B) met the B-B line of (A).

[Drawing 8] (A) and (B) are the sectional views of the ruled line part of the sheet plastic of structure conventionally.

### [Description of Notations]

- 1 Sheet Plastic
- 2 Ruled Line
- 3 Deep Groove
- 4 Shallow Groove Part
- 5 Concave

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[Translation done.]

(19) 日本国特許庁 (J P)

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B 6 5 D 5/42		B 3 1 B 1/25	3 0 1 3 E 0 7 5
// B 3 1 B 1/25	3 0 1	B 2 9 L 7:00	4 F 2 0 9
B 2 9 L 7:00		31:00	
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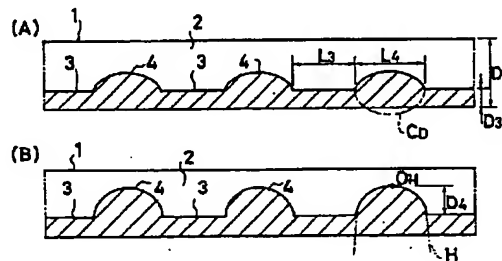
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(54) 【発明の名称】 折り曲げ罫線入りプラスチックシート及び包装ケース

(57) 【要約】

【課題】 折り曲げ罫線入りのプラスチックシートの組み立てを、不十分な折れ曲がりや曲がり過ぎなどを起こすことなく、綺麗に行えるようにする。

【解決手段】 プラスチックシートに設ける折り曲げ罫線を長さ方向に沿って深い凹溝部と浅い凹溝部を交互に配した凹溝で形成し、且つ浅い凹溝部の長さ方向の断面が楕円形状や放物線形状の一部、半円形状、長円形状などの山形となるように設ける。山形の頂部は湾曲形状又は平坦状とする。



## 【特許請求の範囲】

【請求項1】 折り曲げ罫線となる凹溝がその長さ方向に沿って深い凹溝部と浅い凹溝部を交互に設けて形成された折り曲げ罫線入りプラスチックシートであって、前記浅い凹溝部の長さ方向の断面が山形となるように設けたことを特徴とする折り曲げ罫線入りプラスチックシート。

【請求項2】 山形の頂部を湾曲形状又は平坦状とした請求項1に記載の折り曲げ罫線入りプラスチックシート。

【請求項3】 山形が楕円形状の一部、又は放物点を含む放物線形状の一部であるようにした請求項1に記載の折り曲げ罫線入りプラスチックシート。

【請求項4】 深い凹溝部をシート裏面側に貫通させて設けた請求項1～3の何れかに記載の折り曲げ罫線入りプラスチックシート。

【請求項5】 請求項1～4の何れかに記載のプラスチックシートを所定の輪郭に打ち抜き、これを罫線に沿って折り曲げて組み立てた包装ケース。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、自動製函機での組み立てに対応した構造のプラスチックシートに関する。

## 【0002】

【従来の技術】包装ケースに折り曲げ加工されるプラスチックシートとして、図8に断面図で示されているように、シート11の表面に設けられた罫線を形成する凹溝12の底部に、その長さ方向に沿って凹凸を形成し（同図（A））、或いは断続孔を形成し（同図（B））、深さの深い凹溝部13と浅い凹溝部14を交互に設けた構造のものが知られている。

## 【0003】

【発明が解決しようとする課題】従来構造のものは、罫線の底部に凹凸がない構造のものと比較して折り曲げ性が良好であるものの、製函機を用いてシートを組み立てる場合に、シートの材質や厚みなどの条件によっては、曲がり方が不十分でケースを組み立てることができず、例えば組み立てることができてもケースが変形することがあった。これと反対に必要以上に曲がると、やはりケースが変形してしまうことがあった。また、シートの折り曲げに伴って凹溝から露出した凹凸部分がささくれ立って、手触りを悪くしたり割れや裂け目ができたりすることがあった。

## 【0004】

【発明が解決しようとする課題】本発明は従来技術を有するこのような問題点に鑑み、折り曲げ罫線入りのプラスチックシートを自動で組み立てる場合に、不十分な折れ曲がりや曲がり過ぎなどの加工不良を起こすことなく、堅牢且つ綺麗に組み立てることができるようにすることを課題とする。

## 【0005】

【課題を解決するための手段】前記課題を解決するため本発明の折り曲げ罫線入りプラスチックシートは、折り曲げ罫線となる凹溝がその長さ方向に沿って深い凹溝部と浅い凹溝部を交互に設けて形成されており、浅い凹溝部の長さ方向の断面が山形となるように設けたことを特徴とするものである（請求項1）。これによれば、深い凹溝部と浅い凹溝部によって罫線の底部が長さ方向に凹凸しているので、シートの柔軟性と剛性を共に保持して良好な折り曲げ性が得られる。浅い凹溝部が断面山形に設けてあるので、シートを折り曲げたときに罫線内に鋭い凹凸が生じ難くなり、手ざわりが良くなる。

【0006】浅い凹溝部の断面に表れる山形の形状には、中央部が高く、その両側部が均等な割合で低くなる形状の他、頂部が一侧に偏り、その両側が漸次低くなる非対称な形状が含まれる。また、複数の小さな山形を一体の山形に連ね、頂部が複数あるように設けたり、高さが階段状に異なるように表面を段々に設けたりしてもよい。要は、少なくとも一つの頂部を有し、頂部の両側から深い凹溝部に連なって高さが連続的に異なるように設けてあればよい。

【0007】何れの形状でも頂部は湾曲した曲面形状か平坦な形状とすることが好ましい（請求項2）。頂部を湾曲形状や平坦形状に設ければ、この部分の樹脂が圧縮されて強度が高くなるため、シートを折り曲げたときにささくれ立たず、割れや裂け目も生じない。

【0008】山形の形状は、罫線に沿ってシートを折り曲げた際に加工不良を生じないよう、シートの材質や厚み、凹溝の幅や長さ、深い凹溝部と浅い凹溝部の寸法比などに応じて適宜に選定することができる。例えば山形が楕円形状の一部や、放物点を含む放物線形状の一部であるような形状、半円形状、長円形状などとすることができる（請求項3）。シートの折り曲げ性を良好にするため、山形を半円形状、或いは長円形状に設ける場合は、その表面円弧の中心がシート内部に位置するように設定することが好ましい。

【0009】なお、浅い凹溝部と交互に配置される深い凹溝部は、シート裏面から適宜な厚みを有する場合と、裏面側に貫通させて開孔とする場合がある（請求項4）。深い凹溝部を開孔とした場合、折り曲げたときに生ずる歪みや弾性力が凹溝の長さ方向に分散し、深い凹溝部に厚みの有る場合よりも折れ曲がり易くなるが、深い凹溝部を開孔とするか厚みが有るようになるかは、前述した如く、加工不良を生じないよう、シートの材質や厚み、凹溝の成形条件などに応じて選定され得る。

【0010】また、罫線となる凹溝は、シートの片面に設ける他、シートの両面に設けることができる。シートの両面に設ける場合、一側の面の凹溝が前記の如く構成されていればよい。

【0011】また、本発明の包装ケースは、前記各構成



のシートを所定の輪郭に打ち抜き、これを罫線に沿って折り曲げ、組み立てることにより得ることができる（請求項5）。

【0012】なお、本発明が適用されるプラスチックシートとしては、ポリ塩化ビニル、ポリエチレン、ポリプロピレン、ポリエステル、ポリカーボネートなどの単体又は複合シートを用いることができる。シートの厚みは、通常、0.1～1.0mm程度のものが用いられるが、これに限定されない。

【0013】

【発明の実施の形態】本発明のプラスチックシートは、折り曲げ罫線となる凹溝がその長さ方向に沿って深い凹溝部（以下、深溝部という）と浅い凹溝部（以下、浅溝部という）を交互に設け、浅溝部の長さ方向の断面が山形となるようにして形成された構造のものである。以下、シートに形成する罫線の実施形態の一例を罫線部分の断面を示した図面を参照して説明する。図中、符号1はシート、2は罫線、3は深溝部、4は浅溝部を示している。

【0014】図1は、深溝部3に厚みを設けて罫線2を形成した形態を示している。同図（A）は、浅溝部4を、その罫線方向の断面が楕円形状（CD）の一部をなすような曲面形状に設けたものである。同図（B）は、浅溝部4を、その罫線方向の断面が放物点（OH）を含む放物線形状（H）の一部をなすような曲面形状に設けたものである。

【0015】なお、図では、深溝部3と浅溝部4の罫線方向の長さ（L3、L4）をほぼ同じ長さとし、また、深溝部3の厚み（D3）をシートの厚み（D1）のほぼ1/4としてあるが、これに限定されず、シートの材質や厚みなどに応じて適宜に設定することができる。浅溝部4の厚み（D4）も同様である。

【0016】図2は、深溝部3をシート1の裏面側に裏面側に貫通した開孔に設けて罫線2を形成した形態を示している。この形態では、深溝部3の厚み（D3）は0mmとなる。同図（A）は、浅溝部4を、その罫線方向の断面が楕円形状の一部をなすような曲面形状に設けたものである。同図（B）は、浅溝部4を、その罫線方向の断面が放物点を含む放物線形状の一部をなすような曲面形状に設けたものである。同図（C）は、浅溝部4を、その罫線方向の断面が半円形状をなすような曲面形状に設けたものである。この形態では、浅溝部4の表面円弧の中心（O）が、シート1の裏面側縁部に位置するように設定してある。同図（D）は、浅溝部4を、その罫線方向の断面が長円形状をなすような曲面形状に設けたものである。この形態では、浅溝部4の表面円弧の中心（O）が、シート1の裏面側縁部よりもシート内方寄りに位置するように設定してある。

【0017】図3は、浅溝部4を、その罫線方向の断面に表れる山形が、シート内部に中心点を有する二つの円

弧を組み合わせた曲面形状に形成された形態を示している。同図（A）は罫線2を深溝部3に厚みを設けて形成したもの、同図（B）は深溝部3を開孔に設けて形成したものであり、共に浅溝部4は、その両側が深溝部3から一定の曲率半径でシート表面側に厚みを増し、その中央部で表面の円弧が頂点よりも若干低くなって交わるように設けてある。

【0018】浅溝部4の山形断面は、前記楕円形状や放物線形状、半円形状、長円形状、その他の曲面形状や平面形状を適宜組み合わせた形状に設けることができ、図4はその組み合わせの一例を示している。同図（A）は、図3と同様、浅溝部4の断面をシート内部に中心点を有する二つの円弧を組み合わせた曲面形状に設けたものであり、浅溝部4の中央部で、その高さが両側の高さとはほぼ同じとなるようにしたものである。同図（B）は、浅溝部4の断面を、二つの台形状を並べた形状に設けたものである。同図（C）は、浅溝部4の断面を、二つの台形状を並べるとともに、側面を湾曲させ、上面をほぼ平坦状とした形状に設けたものである。同図（D）は、浅溝部4の断面を、三つの湾曲面をほぼ同じ高さに並べた曲面形状に設けたものである。同図（E）は、浅溝部4の断面を、三つの湾曲面からなる曲面形状であって、両側の湾曲面を同じ高さに、中央部の湾曲面をそれよりも高くして、お供え餅のような形に設けたものである。同図（F）は、（E）に示された中央部の湾曲面をさらに小さな円弧の曲面で分割し、全体で四つの円弧を組み合わせた曲面形状に設けたものである。

【0019】図5は、前記各図の深溝部3がその罫線方向の厚みを一定にして設けてあるのに対し、罫線方向に沿って漸次厚みが異なるようにして設けたものである。同図（A）は、罫線2の断面を見たときに、深溝部3の最も厚みが小さい部分と、浅溝部4の最も厚みが大きくなる頂部とが直線で結ばれ、罫線全体として三角波形の断面となるように設けたものである。同図（B）は、（A）に示された浅溝部4の頂部を平坦状としてもものである。同図（C）は、（A）に示された深溝部3の最も厚みが小さい部分と浅溝部4の頂部とを湾曲させ、罫線全体として湾曲波形の断面となるように設けたものである。

【0020】図6は、罫線となる凹溝をシート1の両面に設けた形態を示している。同図（A）は、シート1の表面側から深溝部3と断面楕円形状の浅溝部4からなる罫線2を形成するとともに、シート1の裏面側に、罫線2に沿った一定の深さの凹溝5を設けたものである。この凹溝5は、シート1を折り曲げた際の破損防止のため、深溝部3の厚みよりも小さい深さに設けてある。同図（B）は、シート1の表面側から深溝部3と断面楕円形状の浅溝部4からなる罫線2を形成するとともに、シート1の裏面側の前記浅溝部4の形成位置に断面楕円形状の凹溝5を設けたものである。この場合、凹溝5は、

浅溝部4と同様な断面形状に設ける他、異なる断面形状のものも設けてもよい。

【0021】なお、前記各図において、交互に設けられる深溝部3と浅溝部4の罫線内部における向きは、両部の境界線が罫線方向に対して直交していても、傾斜していても何れでもよい。例えば、図7(A)は罫線2を含むシート1の平面図、(B)はその罫線2に沿った断面を示しているが、同図の如く、罫線2の深溝部3と浅溝部4の境界線が、罫線方向に対して傾斜して設けることもできる。

【0022】各図に示された罫線2の構成は一例であって本発明のプラスチックシートは図示された形態に限定されない。各図の深溝部3と浅溝部4を組み合わせ、又はこれらと公知の罫線構造を組み合わせることは適宜行われる。

【図面の簡単な説明】

【図1】(A)、(B)は深溝部に厚みを設けた本発明の実施形態を示す罫線部分の断面図である。

【図2】(A)～(D)は深溝部に開孔を設けて罫線を形成した本発明の実施形態を示す罫線部分の断面図である。

【図3】(A)、(B)は浅溝部の断面を二つの曲面を\*

\* 組み合わせて形成した本発明の実施形態を示す罫線部分の断面図である。

【図4】(A)～(F)は複数の面を組み合わせる形成した浅溝部の断面を示す図である。

【図5】(A)～(C)は深溝部の厚みを連続的に異ならせた本発明の実施形態を示す罫線部分の断面図である。

【図6】(A)、(B)はシートの表裏両面に凹溝を設けた本発明の実施形態を示す罫線部分の断面図である。

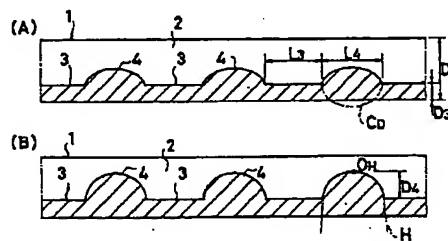
10 【図7】深溝部と浅溝部の境界線を罫線方向に対して傾斜させた本発明の実施形態を示しており、(A)はシートの要部平面図、(B)は(A)のB-B線に沿った断面図である。

【図8】(A)、(B)は従来構造のプラスチックシートの罫線部分の断面図である。

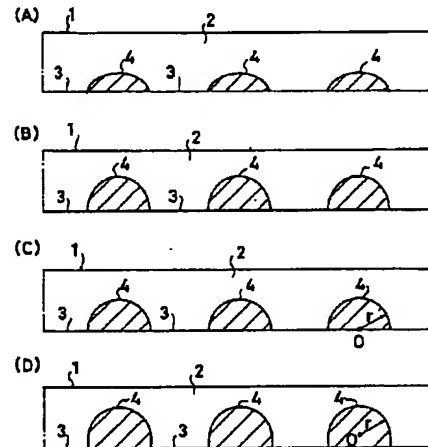
【符号の説明】

- 1 プラスチックシート
- 2 罫線
- 3 深溝部
- 4 浅溝部
- 5 凹溝

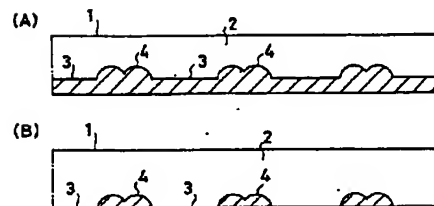
【図1】



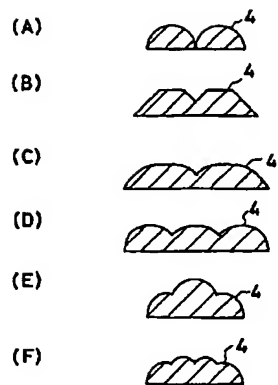
【図2】



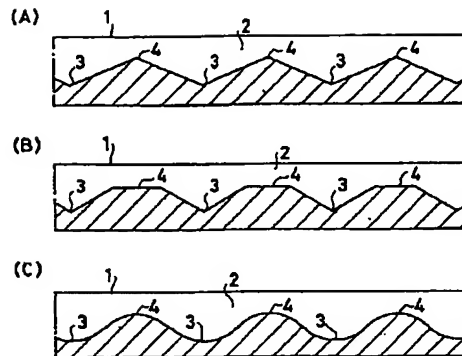
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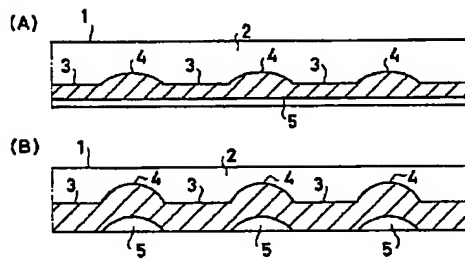
【図4】



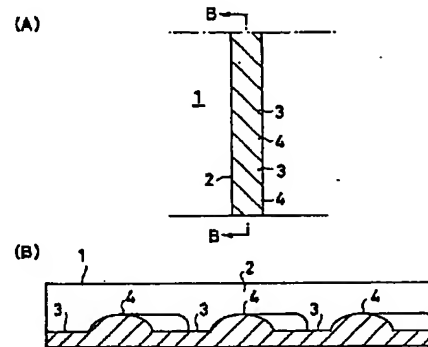
【図5】



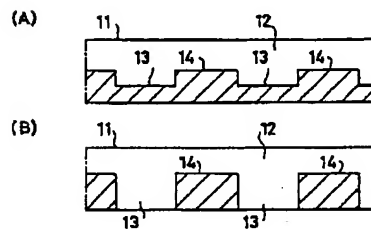
【図6】



【図7】



【図8】



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 3E075 BA01 DB22 GA02  
 4F209 AA04 AA11 AA15 AA24 AA28  
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